Clostridium difficile

Clostridium difficile infections are not classified as reportable in Louisiana.

C. difficile is a spore-forming, gram positive anaerobic bacteria that produces two endotoxin causing disease in humans. It is a cause of diarrheal illness and, in more serious cases, can lead to complications including pseudomembranous colitis, toxic megacolon, colonic perforation, sepsis and death. Symptoms include watery diarrhea, fever, loss of appetite, nausea and abdominal pain. This infection is often, though not always, associated with recent antibiotic use.

C. difficile infections (CDI) are responsible for 15% to 25% of hospital-acquired, antibiotic associated cases of diarrhea (Centers for Disease Control and Prevention [CDC], 2014). Of those diagnosed with CDI, 6% to 25% will experience at least one recurrence of the disease after treatment*. Risk factors for CDI include recent antibiotic use, gastrointestinal surgery or manipulation, long length of stay in a healthcare setting, serious underlying condition, immunocompromised status and age older than 65 years. There is also evidence that many patients may be colonized with *C. difficile* bacteria but remain asymptomatic, with as high as 50% prevalence being reported in some inpatient populations*.

C. difficile is shed in feces and spread via fecal-oral transmission. Common routes of dissemination include contaminated surfaces, devices, materials, or persons who have come into contact with *C. difficile* spores.

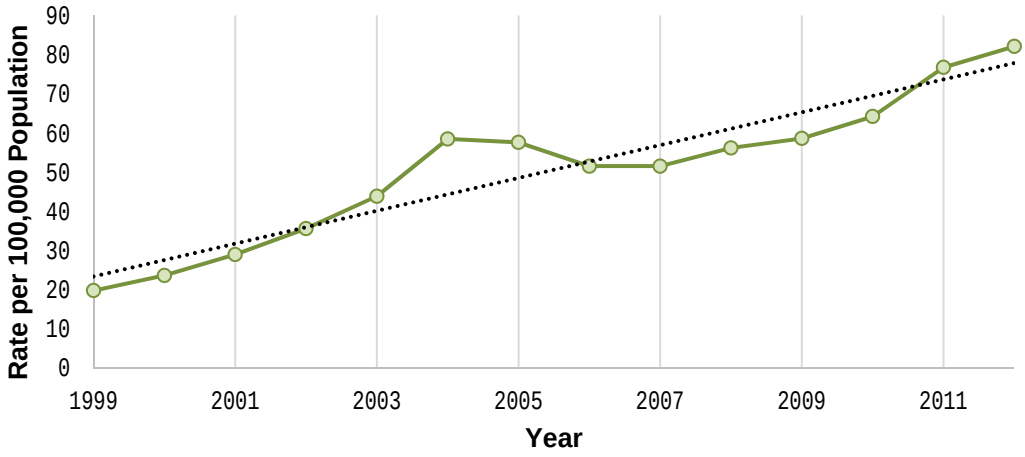
While CDIs are mainly a healthcare-associated illness, community-acquired CDIs are also of concern in 80% of cases (CDC, 2014). Rates of CDI have been increasing since 2001; additionally, outbreaks of more severe disease are increasingly being reported*. Mortality from *C. difficile* infections is reported to be as high as 7% in some studies* and over 6,000 deaths were due to CDI in 2006 (National Vital Statistics Reports, 2009). New strains of *C. difficile* have been found to be both more virulent, causing more severe disease and more difficult to treat, with increasing antibiotic resistance (CDC, 2010).

Clostridium difficile Infections in Louisiana

Between 1999 and 2012, there were a total of 31,871 cases of infection with *C. difficile* reported in hospitalized patients. Case rates ranged from 860 in 1999 to 3778 in 2012, averaging 2277 cases per year. Since 2006 in post-Katrina Louisiana, CDIs have increased at an average rate of 9.5% per year (Figure 1).

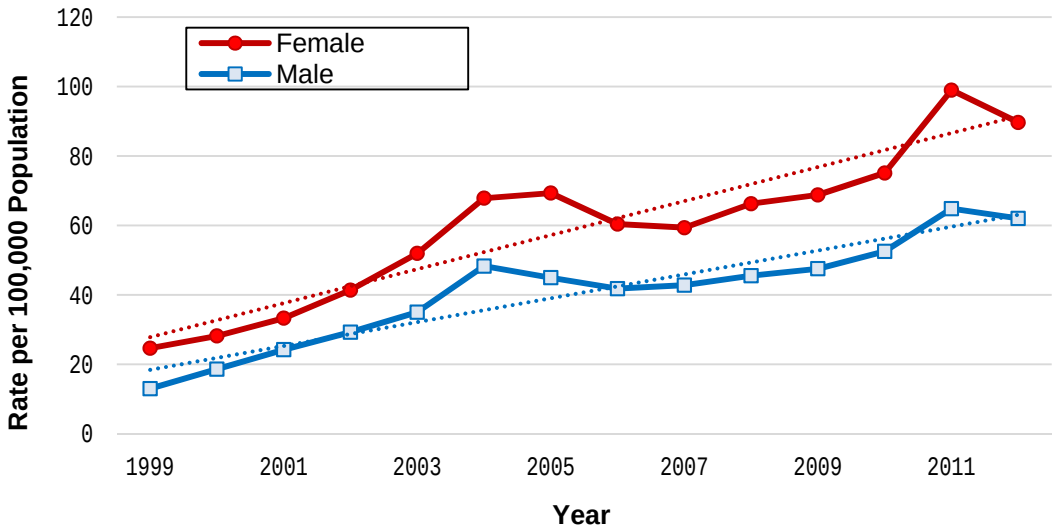
* Society for Healthcare Epidemiology of America [SHEA] - Infectious Diseases Society of America [IDSA] Guideline, 2010

Figure 1: *C. difficile* diagnoses among hospitalized patients - Louisiana, 1999-2012



Between 1999 and 2012, rate of increase per year was similar between men (14.7%), and women (11.8%) , though women continue to represent a higher proportion of cases than men. Overall, women accounted for 60.6% of cases and men represented 39.4% of cases from 1999 to 2012 (Figure 2).

Figure 2: *C. difficile* diagnoses rates among hospitalized patients by sex - Louisiana, 1999-2012



Patients in the 65 years-and-older age group continue to represent a majority of cases of CDI at 61.7% of total cases. This age group had rates of CDI 12 times higher than the second highest rate group and 76 times higher than the lowest rate group. The age group from 45 to 64 years had the second highest rates, representing 23.4% of the total cases. The age group younger than five years of age had the third highest rates of diagnosis suggesting that infections occur more often at the extremes of age. Above the age group of five years-and-under, there are increasing rates of CDI with increasing age. Children and young adults have the lowest rates of CDI diagnosis (Figures 3 and 4).

Figure 3: *C. difficile* diagnosis rates among hospitalized patients by age group
Louisiana, 1999-2012

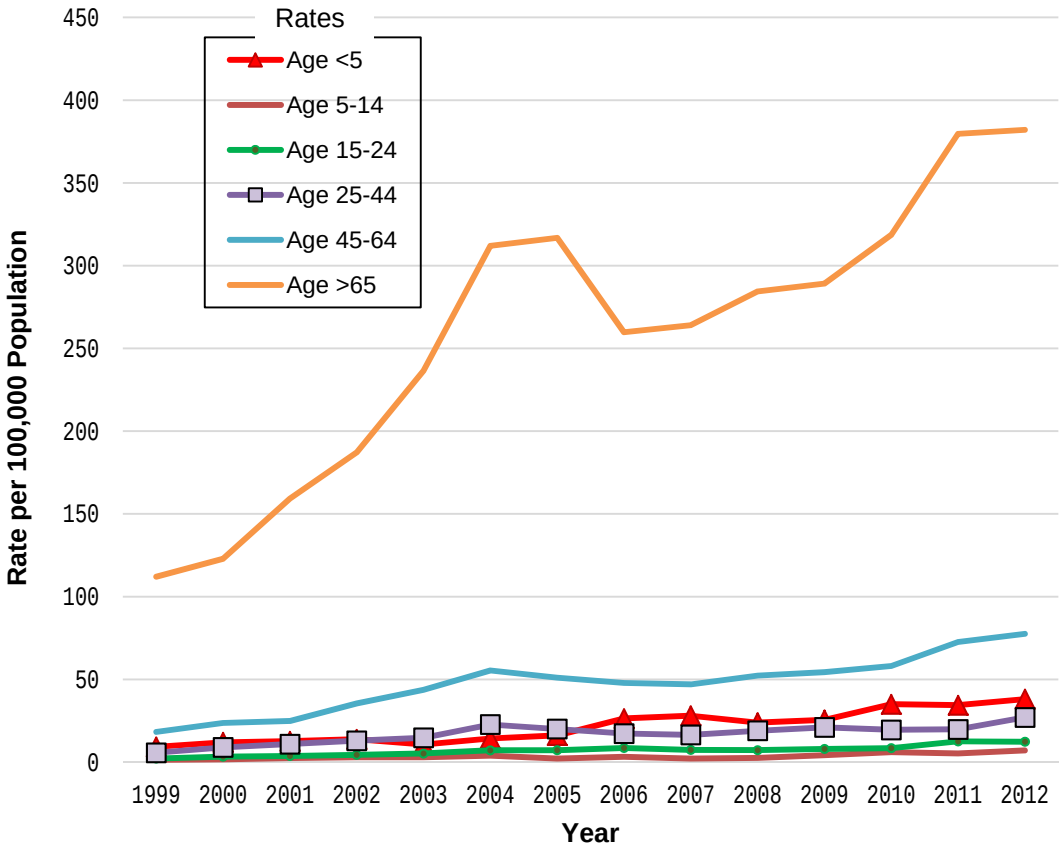
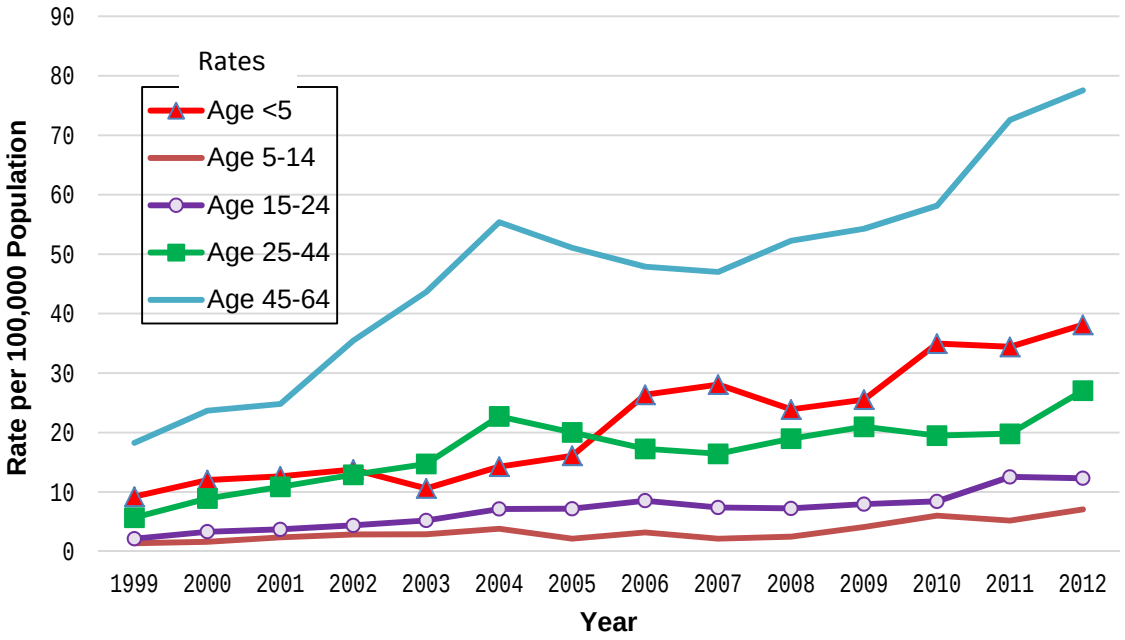
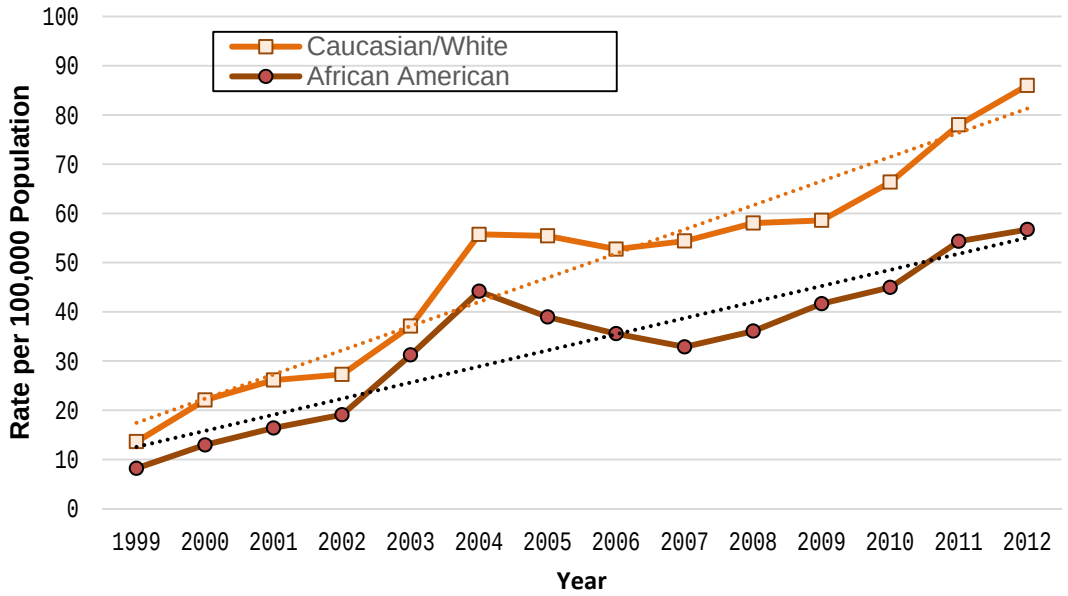


Figure 4: *C. difficile* diagnosis rates among hospitalized patients by age group, omitting age group older than 65 years - Louisiana, 1999-2012



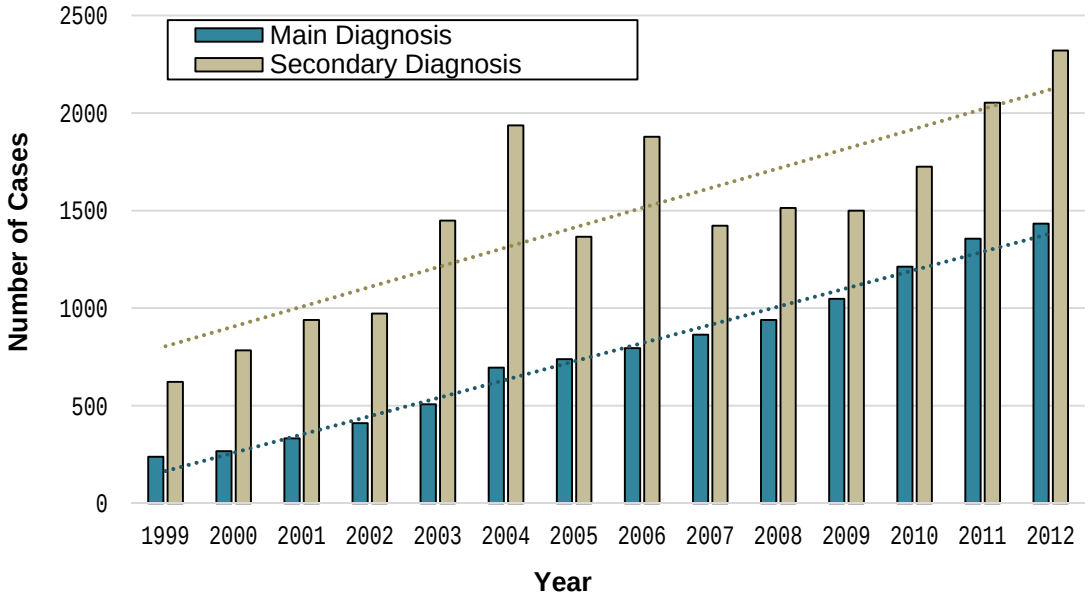
Incidence rates of CDI among hospitalized patients categorized by race continues to have similar rates of increase of this time period. Caucasian/White patients overall had 1.5 times higher CDIs as compared to African-American patients between 1999 and 2012 (Figure 5).

Figure 5. *C. difficile* hospitalizations by race - Louisiana, 1999-2012



During the 1999 to 2012 period, 65.8% of infections with *C. difficile* were patients with CDI as their secondary diagnosis. While the proportion of cases listing CDI as a secondary diagnosis fluctuated in the period between 1999 and 2006, since 2007 it has remained stable at an average of 60% of cases (Figure 6).

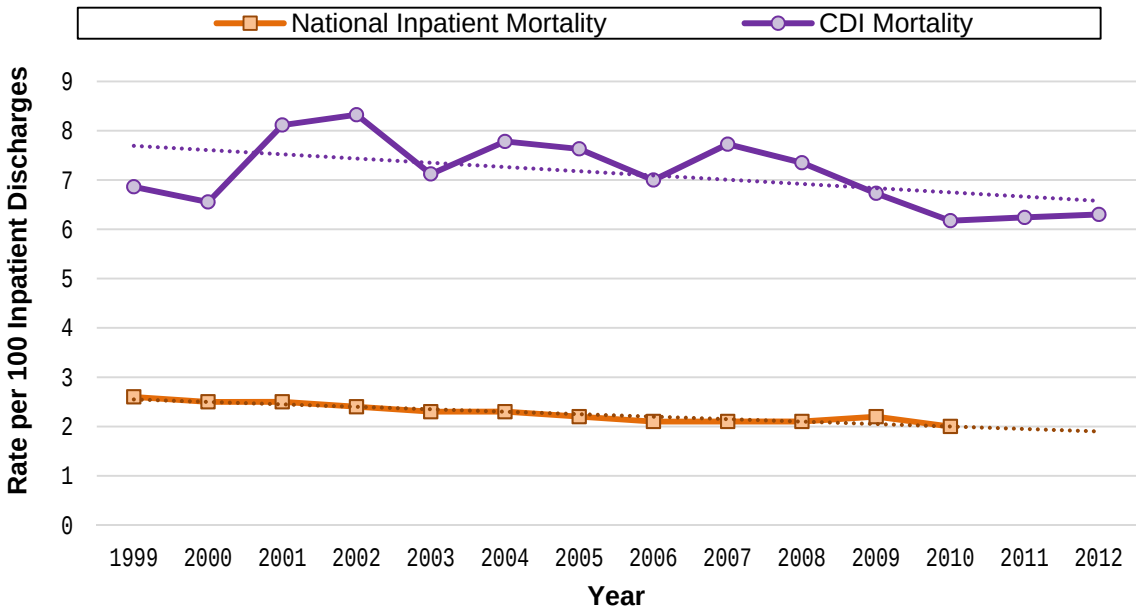
Figure 6: Hospitalized patients with *C. difficile* as main or secondary diagnosis
Louisiana, 1999-2012



C. difficile-Associated Deaths

From 1999 to 2012, the average mortality rate during hospitalization for patients with a diagnosis of CDI was seven per 100 inpatient discharges. This rate peaked in 2001 and 2002 at 8.1 and 8.3 per 100 inpatient discharges, respectively. From 2009 to 2012, the mortality rate in Louisiana has been below seven, averaging 6.4 per 100 inpatient discharges. From 1999 to 2010, national mortality rates for all hospitalized patients averaged 2.275 per 100 inpatient discharges (Figure 7).

Figure 7: Mortality rates for all hospitalization as compared to inpatients with CDI National, 1999-2010 vs. Louisiana, 1999-2012



Prevention

C. difficile is often transmitted by persons touching surfaces or materials contaminated with its spores, and then touching their mouths or mucous membranes. Healthcare workers are at risk of spreading *C. difficile* to their patients, and are indeed the most common mechanism of transmission. Prevention at this level includes healthcare worker education, and strict hand washing and contact precaution protocols, including isolation. As *C. difficile* spores are not killed by alcohol-based sanitizers, increasing reliance of this method of hygiene in place of soap and water hand washing may further increase transmission. Sole use of these hand cleaners in inpatient settings should be avoided. Surfaces and materials should also be targeted with regular cleaning using approved disinfectants with activity against *C. difficile* spores. A patient level approach to prevention that is increasingly being implemented by care providers is the use of probiotics for patients at high risk of CDI, such as patients on antibiotics known to be associated with these infections. Appropriately limiting the over-prescription of antibiotics, or antibiotic stewardship, is another important prevention strategy.